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ABSTRACT

This description of procedures for dumping high and low resolution graphics using the Apple IIe microcomputer system focuses on two special hardware configurations that are commonly used in schools--the Apple Dot Matrix Printer with the Apple Parallel Interface Card, and the Imagewriter Printer with the Apple Super Serial Interface Card. Special instructions for using ProDos are also provided, as well as methods for storing graphics in binary format, using these files in other programs in BASIC, and printing them. Step-by-step instructions are then given for using specific graphics applicable software to print the graphics and for capturing high resolution graphics from other programs. A list of 16 references is included. (MES)

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# CREATING, STORING, AND DUMPING LOW AND HIGH RESOLUTION GRAPHICS ON THE APPLE IIE MICROCOMPUTER SYSTEM

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A presentation

by

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at

The Annual Convention of the
Tennessee Educational Computing Conference
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## INTRODUCTION

One of the capabilities of microcomputers which has generated more than a casual amount of interest on the part of computer users is the area of graphics. Obtaining a hardcopy of the graphic output, or dumping a graphic, from microcomputers is usually a different procedure than normal printing of text materials. Some of the most simple procedures for dumping a graphic is with specially designed hardware, especially printer interface cards. The same results can usually be obtained by using other interfaces with specially designed software. This presentation discusses and outlines procedures for dumping both high and low resolution graphics with the Apple //e microcomputer system and a number of specific hardware configurations and software adaptations.

A full discussion of this topic is not possible since there are so many different ways of accomplishing graphic dumps. It is the intent of the author to provide information relating to both hardware and software which he has used successfully and to mention a few, but not all, of the other options available for enjoying success in this area of computer application. A special effort is made to discuss methods for dumping graphics with the most common hardware configurations which have been furnished by Apple Computer, Inc.(1) on special school buy plans. Specific attention is given to two Apple //e systems; the Apple Dot Matrix Printer with the Apple Parallel Interface Card, the most common configuration supplied to the schools through December 1983; and the Imagewriter Printer with the Apple Super Serial Interface Card, this system has been the most common configuration supplied to the schools since January 1984.

## HARDWARE CONFIGURATIONS AND INSTRUCTIONS FOR GRAPHIC DUMPS

Following are descriptions of a few of the special hardware configurations which can be used with the Apple Microcomputer System to dump graphics. There are numerous other configurations available to those who wish to pursue this topic further.

### A. Pkaso Interface Card with Apple DMP and Epson DMP

The Pkaso Interface Card developed and marketed by Interactive Structures Inc.(2) can be obtained through most Apple Dealers. Since there are a number of versions of the card available it is essential that the appropriate card for the Apple Dot Matrix Printer or your particular brand of printer be acquired. This card provides a very simple method for obtaining hardcopies of both low and high resolution graphics produced on the Apple //e with either the Apple Dot Matrix Printer or the Epson series of printers.

To use this card one first gets the low resolution graphic on the

screen, places the microcomputer into printer mode with PR#1 then gives the command Control I followed by the letter D or 2D to dump the low resolution graphic which is on the screen. The procedure for dumping the high resolution graphic is similiar except one uses the command Control I followed by 2H for any graphic formed with HGR and Control 1 followed by 3H for graphics formed with HGR2.

This procedure will work regardless of whether the high resolution graphic is visible on the monitor or not so long as the image is still present in the special high resolution memory pages. Thus one can dump a graphic from LOGO or PILOT or any other program so long as no new graphic is loaded into memory and the system is not turned off. To dump the graphic from other software packages, one simple places an initialized diskette which does not have a graphic as part of the introductory program in drive one and then hits Control Reset. If the program can be broken into the microcomputer will drop into BASIC as noted by this symbol, ] , and the flashing cursor. Simply follow the above procedures to dump the graphic. If the software program does not break into BASIC the initialized diskette will boot which will place it in BASIC mode. Follow the above procedures for dumping the graphic.

B. Fingerprint, Grappler and Print-It Interface Cards

The Fingerprint Interface Card can also be acquired from your Apple dealer or through the Thirdware Corporation(3). This interface card has a special button which allows one to dump low or high resolution graphics and text directly from the screen to the printer and to come back to the program. One simply follows the menu which comes to the screen to dump the high resolution graphic. To dump a low resolution graphic one must first go through the conversion process outlined in the manual for the interface card.

Print-It is also a special interface which allows screen to paper dumps of low or high resolution graphics as well as text materials. It can be obtained through your Apple dealer or through TEXPRINT, a Subsidiary of Computer Products, Inc.(4) As of this date this presentor has not used this system.

The Grappler Interface cards(5) have a direct screen dump routine for high resolution graphics. They can be used to dump low resolution graphics if one first converts the low resolution screen to high resolution. The routines for converting low resolution to high resolution are discussed later in this paper.

A perusal of journals will quickly indicate that there are a number of special printer interface cards available for Apple II microcomputer systems. In choosing a special interface card it is very important that you see a demonstration of the ease of operation and breadth of capabilities before ordering the equipment.

C. Apple Mouse with Mousepaint

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AUTHOR ABSTRACT
(To Accompany Document Submitted to ERIC/IR)

Author: Dr. Richard K. Fletcher, Jr.

Title: Creating, Storing, and Dumping Low and High Resolution Graphics on The Apple 11E Microcomputer System

Abstract (up to 200 words):

This paper discusses and provides examples of created graphics in low and high resolution format on the Apple 11 microcomputer. Methods for storing graphics in binary format and using these binary files in other programs in BASIC and printing them are discussed through specific examples. Instructions are given for using specific graphics applicable software for printing the graphics. Ways of capturing graphics generated from other programs are included in the paper. In addition, information relating to hardware configurations are reported.

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The addition of the mouse to the Apple //e or //c systems has opened up a considerable number of possibilities for creating complex graphics with little knowledge of programming. This option, which is exclusively in high resolution graphics, provides for graphic dumps on most dot matrix printers directly from a menu print option. There is rapid advancement occurring in the development of both hardware and software which allows one to use output from Mousepaint in other applications. The advertisements for the Print-It Interface Card and software indicate that it supports such applications. It is important to note that graphics created in Mousepaint must be stored on diskettes formatted in PRODOS rather than D.O.S. 3.3.

D. Apple Parallel Interface and Apple DMP or the Apple Super Serial Card and the Imagewriter or Imagewriter II Printer

Until January 1984 the most common configuration supplied to the schools by the Apple Computer Company was the Apple Dot Matrix Printer and the Apple Parallel Interface Card. Dumping graphics from this configuration requires software since there is no direct dump feature with the hardware. The same software program, the Imagewriter Tool Kit, which is available to dump high resolution graphics with the more recent Apple printer configuration, the Imagewriter or Imagewriter II and the Apple Super Serial Card, is used for high but not for low resolution graphic dumps. Recently such programs as Triple-Dump by Beagle Brothers,Inc.(6) and Printographer by Roger Wagner Publishing(7) have provided additional options for dumping low resolution graphics with this configuration. Following is a description of how one uses the Printographer software program for dumping low and high resolution graphics.

The first step in using the Printographer software program is to configure it to your particular printer and interface system. Instructions for completing this task are included in the pamphlet which comes with the program. This involves exiting to BASIC and typing RUN CONFIGURE and following the menu options. Once the program is configured the use of the program is very simple. To dump a high resolution graphic one first brings D.O.S. 3.3 up into the microcomputer then produces the high resolution graphic on the screen. The Printographer diskette is placed in one of the drives and the command RUN PRINTOGRAPHER, Dn is sent to the microcomputer. This results in a menu where one selects the second option, from memory, and follows the remaining menu options to obtain the printed graphic. It is noted that the option to print inverse or normal as well as varied sizes is available with Printographer.

It is equally easy to dump the graphic using Triple Dump which was noted above. In both Printographer and Triple Dump one may select the graphic from either memory or from a binary file on disk. When using either program be sure to configure them to the particular printer and interface prior to using them, otherwise you will end up with a printer lock.

To dump a low resolution graphic with Printographer or with Triple Dump one must first convert it to a high resolution graphic with one of the options available with the software or with the convert lores to hires screen program discussed elsewhere in this paper. When the low resolution graphic is on the screen one inserts the Printographer software diskette and types BRUN Low to High.RM. This program, which is on the Printographer diskette, converts the low resolution graphic to high resolution format which can be dumped as indicated above.

High resolution graphics can be dumped with the Imagewriter Tool Kit program which was furnished by Apple Computer Co. with your Imagewriter Printer until early 1986. As indicated above, this program, which exists in both D.O.S 3.3 and in ProDos, works both with the Apple Dot Matrix Printer and the Apple Parallel Interface Card as well as with the Imagewriter Printer and the Apple Super Serial Card. However, the D.O.S. 3.3 version does not work with the Apple IIC microcomputer. The first step is to bring up D.O.S. 3.3 and then create the high resolution graphic. The next step is to insert the Imagewriter Tool Kit Diskette, D.O.S. 3.3 version, and type RUN HELLO. A menu comes up which you can follow to produce two different sizes of the graph as well as normal and inverse options. If your graphic file is stored as a binary file you can use the load option and load the graphic directly through the software. If one is operating with the ProDos version of the Imagewriter Tool Kit Diskette, the only change is that you should type RUN STARTUP rather than RUN HELLO. It is noted that one can use the ProDos version of Imagewriter Tool Kit to directly load a binary picture file saved through Mousepaint or any other software program such as LOGO II which uses ProDos.

To use the Imagewriter Tool Kit to dump a low resolution graphic it is first necessary to convert it to high resolution format. A machine language routine published in the December 1984 edition of In Cider magazine by Steinborn(8) works very well to convert a low resolution graphic to high resolution. This author has this program on disk under the filename LORES TO HIRES IN D.O.S. 3.3 and has converted it to ProDos as LORES.TO.HIRES. One can also use the same procedure outlined above using Printographer to convert the graphic then use either the Imagewriter Tool Kit, Printographer, or Triple Dump to dump it to either of the Apple Printers. The Imagewriter Tool Kit Programs allow for two options in size and an inverse or a regular format. However, you cannot trim nor can you rotate the image as you can with Printographer and Triple Dump.

## SPECIAL INSTRUCTIONS WHEN USING PRODOS

The recent changes by the Apple Computer Company toward the use of ProDos rather than D.O.S. 3.3 is beginning to impact what is happening in the schools. The Computer Skills Next Program developed by the State Department of Education in Tennessee(9) uses ProDos as the main operating system. Thus a discussion of software essential for dumping graphics while in this system is included in this report.

Through the assistance of the authors of Printographer a ProDos version of the low to high resolution conversion program has been made available. This was essential since problems were encountered by these presentors when attempting to use the ProDos conversion routine outlined with the Printographer Program. Specifically, the top part of the graphic was being cut-off during the conversion process. The use of the PRODOS version of the low to high conversion program with the Printographer program can be followed to successfully dump the newly created high resolution graphic by following this procedure: First create or load your low resolution graphic while in the PRODOS operating system. Second, type BRUN LOW.TO.HIGH.RM after placing the diskette containing the file in the disk drive. Then place the Printographer or Triple Dump diskette in drive one and type PR#6. Though you have booted the diskette and are no longer in ProDos, the graphic image remains in the high memory of the microcomputer. Simply follow the menu for the Printographer or Triple Dump program to dump the graphic.

An alternative to the Printographer program is to follow the first two procedures outlined above until you obtain the converted graphic (low to high resolution) then place the ProDos version of the Imagewriter Tool Kit in one of the drives and type RUN STARTUP,Dn. Simply follow the menu from this program to dump the graphic.

Another alternative using the Imagewriter or Imagewriter II printer only is to boot your LOGO II software, which is in ProDos, place your ProDos data diskette in drive 2, and type in the following sequence:

HT (this hides the turtle)
LOADPIC "/DISKNAME/FILENAME (diskname for your ProDos data diskette and filename for your binary file stored on the diskette)
PRINTPIC 1
Your high resolution graphic image should print.

## HIGH RESOLUTION MEMORY PAGES AND BINARY STORAGE

Much of the content of the remainder of this paper relates to the specialized use of software packages used in dumping graphics. Considerable attention is also given to the saving or storing of binary files of graphic images. Storing files in this manner requires special attention to memory locations in the Apple IIE and Apple IIC Microcomputers. Full understanding of this topic requires knowledge of more than a cursory level of BASIC programming. The presentation which follows has been developed as a step by step procedural outline which can be followed by individuals who have limited training in computer.

The primary storage area on the Apple II is specific for certain types of computer input. Memory locations from 0 to 767 are for storing system programs, stack, and keyboard buffers. Locations from 768 to 1007 are used to store shape table information or short machine language programs. Special monitor addresses are stored in locations 1008 to

1023. The memory locations for text material and low resolution graphics occupy the same storage areas. The main storage page (page 1) for these modes is at memory locations from 1024 to 2047. Page 2 storage for these modes is from memory locations 2048 to 3071. Programs written in BASIC are stored in locations beginning at 2048 and ending at 8191. The two formats for high resolution graphics, HGR and HGR2, are stored in two different locations. The high resolution page for graphics created under the HGR mode are stored in memory locations from 8192 to 16383. Storage of graphics created with HGR2 are in memory locations from 16384 to 24575. Storage of input from the Disk Oprating System is in memory locations from 38400 to 49151. Haskell(11)

Experienced programmers can move into other designated areas by using Peek and Poke commands. There are specially designated memory locations between 49152 and 65535 which relate to the language card for the Apple II. In these areas one can load other languages such as Integer BASIC, FORTRAN, and any of the several other languages which are available for the Apple II. This area of memory must be installed on the Apple II and Apple II+ in Slot 0. It is built into the mother board for the Apple IIE and Apple IIC. Also, the additional memory which can now be added to the Apple II, up to 3.0 megabytes or beyond, can be addressed directly by a programmer. This memory is now being used by some individuals as a temporary (virtual) high speed additional disk drive used to speed up the operation of programs by changing the process from a mechanical to an electronic input.

Saving a high resolution graphic located in one of the high resolution memory pages to diskette can be easily accomplished if you can retain the graphic in memory. When breaking out of the program you will either retain or reboot the D.O.S., then you use the BSAVE format for saving the file. When using BSAVE versus SAVE one must add additional information which specifies the beginning and length of the memory location for the file. One can save either the HGR or the HGR2 pages by using specific information, in hexidecimal format, which corresponds to the decimal memory locations discussed earlier. To save a high resolution graphic created and stored in the HGR page of memory as a binary file one can use: BSAVE filename, A$2000, L$2000. To save a high resolution created in HGR2 one would use: BSAVE filename,A$4000,L$2000. This information plus additional tables correlating decimal and hexidecimal locations are included in a book by Poole, et.al. (12)

## SPECIFIC EXAMPLES OF CAPTURING, SAVING, AND DUMPING HIGH RESOLUTION GRAPHICS (BOTH HGR AND HGR2)

Following are a number of examples, described step-by-step, for using the information discussed above. Details for creating the graphics are also included for the benefit of those who have little mastery of programming in graphics and who may not have had experience with the various software programs used in this presentation.

Example 1 - Low Resolution Graphic

To create a simple low resolution graphic in BASIC on the Apple II you should first boot up a D.O.S. 3.3 data diskette then type and run the following program:

```
NEW
10 GR :COLOR=15
20 VLIN 0,39 AT 0:VLIN 0,39 AT 19:VLIN 0,39 AT 39
30 HLIN 0,39 AT 0:HLIN 0,39 AT 19:HLIN 0,39 AT 39
RUN
```

A graphic similar to a window should appear on the screen. You can save this as an Applesoft BASIC file by typing SAVE FILENAME such as:

```
SAVE WINDOW
```

This does not store the graphic, only the file which creates it. To save the file as a graphic or to dump the graphic to the printer you must first convert it to a high resolution graphic by running the conversion program from one of the two previously mentioned software programs:(Printographer or Steinborn)

```
BRUN LOW TO HIGH.RM  (FROM PRINTOGRAPHER)
BRUN LORES TO HIRES  (FROM STEINBORN)
```

Following this procedure there is no apparent change on the monitor but the program can now be treated as a high resolution graphic. To save the file to your D.O.S. data diskette you must save it as a binary file using such a procedure as follows:

```
BSAVE WINDOWGRAF, A$2000,L$2000
```

Check your diskette by typing:

```
CATALOG
```

If properly stored it should appear on the catalog as:

```
B 034 WINDOWGRAF
```

To call this program back into another program written in Applesoft BASIC, you should use this sequence of commands at the proper time:(Line numbers will depend on when you want to call for the graph. You may want to load it into memory early in the program and call for it at a later time.)

```
10 PRINT CHR$(4) "BLOAD WINDOWGRAF,A$2000"
```

The above command loads the graph into memory in the HGR page for graphics. To bring the graph to screen type:

```
20 POKE -16297,0
```

```
30 POKE -16301,0
40 POKE -16300,0
50 POKE -16304,0
SAVE LOADER (Though not essential, saving this file will save time
later.)
RUN
```

The graphic should appear immediately. If this is the end of the program the graph will remain on the screen, if it is not it will appear for only an instant and the next part of the program will replace it. To show the graphic for a specified period of time you must slow the system with a counting loop or a wait time command. An example of a counting loop follows:(This will keep the graphic on the screen for approximately five seconds. To vary this assume each 1000 to equal to approximately one second.)

```
60 FOR N = 1 TO 5000: NEXT N
```

To dump the graphic to the Apple Dot Matrix Printer or to the Apple Imagewriter Printer you can use one of these three software packages, Printographer, Triple Dump, or Imagewriter Tool Kit. Printographer and Triple Dump allow for more options including the ability to trim the graphic, something usually essential when dumping a converted low resolution graphic. Following are the procedures when using each of these three software programs.

After completing the conversion from low to high resolution shown above the first step is to insert the Imagewriter Tool Kit D.O.S. 3.3 version and type:(Remember, This version of Imagewriter Tool Kit will not work with the Apple IIc.)

```
RUN HELLO
```

When the screen flashes a 1 for printer interface slot, press the RETURN key. Select the option, SHOW GRAPHIC, from the menu by pressing the number 2 on your keyboard FOLLOWED BY RETURN. Press the number 3 to CHANGE THE PRINT FORMAT and the number four to SELECT FULL PAGE INVERSE. Press the ESC key to return to the main menu followed by selecting the option for PRINTING THE GRAPHIC, 4 on the keyboard. The graphic dump should begin if the printer is on and properly installed.

If you intend to use the Printographer program you should also use the diskette both for the low to high conversion and for the printer dump. It is essential that the Printographer program be properly installed for your particular printer and interface card. This program can be matched to almost any type of printer and interface by using the installation routine on the diskette.

After creating the high resolution graphic in D.O.S. 3.3, insert the printographer program diskette in drive one and type:

RUN PRINTOGRAPHER or PR#6 followed by RETURN

When the menu appears with choices, choose the second option, SELECT FROM MEMORY, if the graphic is already in the memory of the computer, or if you wish to load a binary file directly to the machine, choose the first selection on the menu. There are numerous options which can be taken if alteration of the graphic is desirable. If it is necessary to trim a converted low resolution graphic choose 'b' and use the arrow keys to trim the garbage then to dump the graphic to the printer choose the letter 'p' from the menu. Trial printings by choosing various settings will produce the outcome you wish.

When using Triple Dump it is easier if you first convert from a low resolution to a high resolution and do a binary save before booting the Triple Dump program. If the graph is in memory in D.O.S. 3.3 you place the Triple Dump program disk in Drive 1 and type PR#6 followed by RETURN. Select R to run the program then select the print option to print it. If you load from the disk you would first select the load option then the print option. (Note this writer could not get Triple Dump to work with the Apple IIc.)

Example 2 - High Resolution Graphic Page 1

Much of what has been discussed in the previous section applies to a high resolution graphic created under the HGR or page 1 format. Once the graphic has been developed or captured from another program, there is no need to do the low to high conversion and the remaining procedures outlined above are identical. Following are the steps in creating a simple high resolution graphic for high resolution memory page 1:

```
NEW
10 HGR:HCOLOR=7
20 HPLOT 0,0 TO 279,0 TO 279,159 TO 0,159 TO 0,0
30 HPLOT 0,0 TO 279,159:HPLOT 0,159 TO 279,0
40 HPLOT 139,0 TO 139, 159:HPLOT 0,79 TO 279,79
RUN
```

This plot will create a window like structure with diagonals which can be saved similarly to the previous procedure described above. Following are the commands for saving the file in BASIC and then in binary:

```
SAVE HGRWINDOW
BSAVE HWINDOWGRAF,A$2000,L$2000
```

All other references for dumping and recalling the graphic are the same.

Example 3 - High Resolution Graphic Page 2 or HGR2

The use of HGR2 is similar to HGR but the HGR2 format uses the entire screen. Following is an example of the creation of a high resolution graphic and the procedure for saving it as a file in BASIC

and in binary format.

```
NEW
10 HGR2:HCOLOR=7
20 HPLOT 0,0 TO 279,0 TO 279,179 TO 0,179 TO 0,0
30 HPLOT 0,0 TO 279,179:HPLOT 0,179 TO 279,0
40 HPLOT 139,0 TO 139,179:HPLOT 0,89 TO 279,89
RUN
```

The graphic created will be similar to that which was created in the HGR format except for the vertical dimensions. To save this graphic in BASIC and then as a binary file follow these steps:

```
SAVE HGR2WINDOW
BSAVE HGR2WINDOWGRAF,A$4000,L$2000
```

A CATALOG of your diskette should reflect the saved files. To recall these files from the diskette and to dump them to a printer is done similarly but there are a few changes. Interestingly, you can load a binary file back into a BASIC program to either page 1 or page 2 regardless of which page you used in creating it before it was stored on the diskette. Since you can only dump the graphic with the Imagewriter Tool Kit if it is in memory location for page 1, it is advised that you load the graphic directly from the diskette as was shown above. If you wish to have one graphic in memory location page 1 and another in memory location page 2 and toggle between them you would need to use Printographer to dump the graphic in page 2 to the printer. Also, the poke commands are slightly different for calling on the graphic in page 2 of the Apple's memory. Following is a sample program for loading two different files in the two memory locations and toggling back and forth between them.

```
NEW
10 PRINT CHR$(4) "BLOAD HWINDOWGRAF,A$2000"
20 PRINT CHR$(4) "BLOAD HGR2WINDOWGRAF,A$4000"
30 POKE -16297,0
40 POKE -16301,0
50 POKE -16300,0
60 POKE -16304,0
65 HOME
70 FOR N = 1 TO 3000 :NEXT N
80 POKE -16297,0
90 POKE -16302,0
100 POKE -16299,0
110 POKE -16304,0
120 FOR N = 1 TO 3000:NEXT N
130 GOTO 30
SAVE DOUBLELOADER
RUN
```

It is assumed that the binary files which were called for in the preceding program are on the data diskette D.O.S. 3.3 in drive one.

Also, the reason the loader file was saved to the data diskette was to enhance the acquisition of these files when you wish to use them at a later date, and you can edit new filenames into this loader file when you decide to change graphics.

Example 4 - Capturing Graphics from Other Programs

Most of the graphics generated by software programs are in one of the high resolution formats. This discussion relates only to capturing graphics which are in high resolution format since the procedures which are followed would destroy the low resolution graphic. The only way known to this writer to capture a low resolution graphic is to carefully get into BASIC mode without losing the image nor the D.O.S. and run one of the convert programs to change it to high resolution. If you can break out of a software program with CTRL C followed by pressing the RETURN key you will not interfere with the graphic on the screen nor with the disk operating system. Storing or dumping the graphic is easily accomplished by following the procedures outlined above.

It is generally true that if a high resolution graphic can be generated by any software program it can be captured, stored as a binary file, and dumped to the printer. Once the graphic is on the screen of the monitor or you know it is stored in one of the memory pages for high resolution graphics the following steps are used for accomplishing this feat:

STEP 1 - Place an initialized data disk for D.O.S. 3.3, which has no graphic images in the HELLO file, in drive one and press CTRL and RESET. This will either drop you into BASIC or boot the data diskette. This is true even though you may be in PRODOS. If it boots the data diskette go to STEP 3. If it drops you into BASIC go to STEP 2. If the CTRL RESET does not drop you into BASIC or boot the diskette capturing the graphic is made much more difficult. Using a CTRL OA RESET to boot the system will not lose the graphic but will damage it with garbage. Sometimes specks will show on the screen from a CTRL RESET, they will always appear if you use CTRL OA RESET to boot tge system.

STEP 2 - Boot the disk with PR#6 and RETURN. This enables you to get the disk operating system back into the memory of the microcomputer. Do not use CTRL OA RESET for it will destroy the clarity of the graphic. However, if you cannot get into BASIC this writer does not know of another viable choice.

STEP 3 - Save the file in binary as shown above and dump it to the printer with Printographer or Triple Dump. It is important to note that the Printographer program allows you to dump graphics from memory page 2 while this writer has not been able to do that directly with the Imagewriter Tool Kit. Once saved to the diskette, the file can be loaded back into any program in BASIC as noted above. Also, you may wish to bring the graphic into a program such as Apple Mechanic (13) where you can use the many fonts available with this program or the additional data diskette, Typefaces (14). This can serve as an interesting way to

dress up a graphic with as many as 30 different fonts. This procedure is outlined below:

Example 5 - Writing on High Resolution Graphics

Mixing text generated with various fonts with high resolution graphics can be accomplished many ways. A simple procedure used by this writer is to create or capture the graphic and store it as a binary file. Once this is accomplished you can follow these steps to bring the graphic back into Apple Mechanic, complete your lettering, and restore or dump the graphic in the revised form.

STEP 1 - Boot the Apple Mechanic program diskette and select the option to RUN XTYPER. Select the option to clear the high resolution screen.

STEP 2 - Place the data disk with the binary graphic file in drive one. Select the option to load the graphic to memory. When the filename is requested, type it in the specified space and press the RETURN key.

STEP 3 - Place the diskette, either Apple Mechanic or Typefaces, for loading the font types in drive one (or change the disk drive location to drive 2) and select up to three different fonts. i.e. ]APPLE OR ]SMALL STANDARD OR ]FATSO

STEP 4 - Go into the format for editing your graphic by pressing the RETURN key. You may need to study your Apple Mechanic manual to learn how to use the program.

STEP 5 - Place your data diskette back in drive one or your selected drive and select the option for saving the file under a new name. If you wish you can go back to BASIC by quitting the program and save the file in binary as outlined above. Saving the file by either procedure is adequate. To dump the graphic to the printer follow the steps outlined above.

SUMMARY AND IMPORTANT NOTE

IMPORTANT NOTE: THE D.O.S. 3.3 VERSION OF IMAGEWRITER TOOLKIT SOFTWARE WILL NOT WORK WITH THE APPLE IIC MICROCOMPUTER SYSTEM. THE PRINTOGRAPHER SOFTWARE WILL WORK WITH THE APPLE IIC SYSTEM BUT THE TRIPLE DUMP SOFTWARE WILL NOT WORK.

This paper has covered some of the options for creating, saving, dumping, and calling up graphic files. As you work through the paper I am sure that you will find many other options not selected by this writer. Also, you will surely begin to grow in your knowledge of the way information is stored in the Apple II microcomputer. You will want to read sources which deal with this topic such as a recent article in the March 1987 isse of Classroom Computer Learning . Also, this writr is just beginning to learn about how to use output from sources as Print Shop with other graphics programs. This writer would be pleased to hear from you if you have knowledge or experience beyond the scope presented

in this paper. My full address follows:

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REFERENCES

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